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ABSTRACT

Investigated was the functional relationship between specific academic survival skills (Attending, Volunteering, Work, and the negative behavior, Looking Around) and academic achievement (reading achievement). Ss were students in three regular first grade classrooms, one of which served as a control classroom. Following a teacher training program, teachers trained experimental Ss in the target survival skills using social and non-social reinforcement, vicarious reinforcement, and shaping procedures. The Gates-MacGinitie Reading Readiness and Primary A were administered before and 4-6 weeks after the intervention program. During each testing week, observations of each S's classroom behavior during reading periods were made for 5 consecutive days. An interactive coding system was used to record survival skill behaviors. Data supported the hypothesis that an increase in survival skills leads to a similar increase in academic achievement. Among Ss matched for mean survival skill scores and standard deviations, experimental Ss gained over three times as much in survival skills and almost twice as much in reading as did the controls. (KW)

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CORBEH

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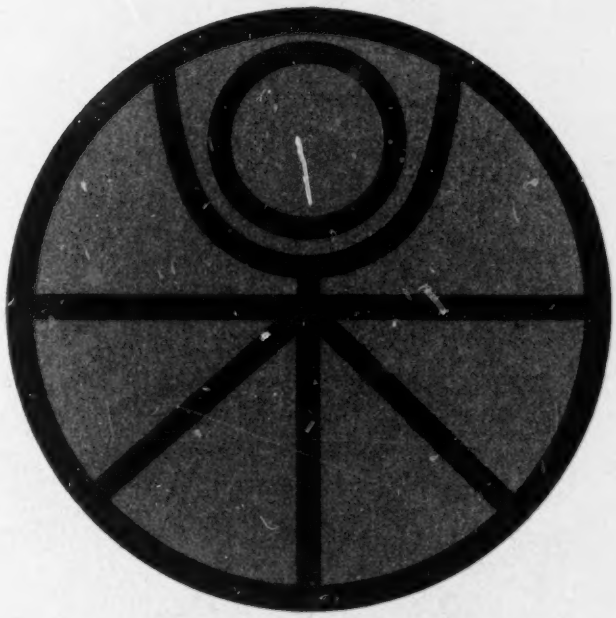
Hyman Hops and Joseph A. Cobb



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Survival Behaviors in the Educational Setting: Their Implications for Research and Intervention

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June 1972

Hyman Hops and Joseph A. Cobb
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SURVIVAL BEHAVIORS IN THE EDUCATIONAL SETTING: THEIR IMPLICATIONS FOR RESEARCH AND INTERVENTION

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A major focus of CORBEH, the Center at Oregon for Research in the Behavioral Education of the Handicapped, is the prevention and remediation of behaviors which are incompatible with successful social and academic functioning in educational settings. The wide variety of behaviors which children emit are conceptualized as forming two broad classifications: educational survival skills and academic responses. Educational survival skills are distinct from academic responses and are defined as a group of behaviors which act to increase the probability of successful functioning in any education setting. Two subgroupings of survival skills are conceptualized: social and academic. The former, consisting of such responses as smiling, greeting, and cooperative play, are components of positive social interaction among students and their teachers. The latter subgroup is composed of behavioral categories which are assumed to be necessary prerequisites for correct academic responding. Examples of these might be looking at the reader or arithmetic page and following the teacher's instruction.

The second broad group of behaviors consists of the precise academic responses related to curriculum content. High achievement, for example, involves high rates of correct responding to specific academic materials. It is likely, however, that there are minimal levels of survival skills required before such high rate responding can be performed. The present model assumes, therefore, that adequate levels of survival skills and

academic responding are both required for successful performance in the educational environment.

The Center conceptualizes both groups of behaviors as primarily under environmental control, more specifically, the behavior of the teacher and peer group. It is believed that an ongoing interactive process occurs such that the levels of students' survival skills and academic responses affect and are affected by the responsiveness of the environment. An effective remedial approach, presumably, would have to involve the child's social agents.

To answer research questions arising out of such conceptualizations, the Center adopts an empirical research model based upon a temporally progressive sequence of hypothesis testing. For example, the development of an efficient and effective program of remediation based upon the previous conceptual model would require some preliminary investigations. First, the analysis of a broad range of children's classroom behaviors would be conducted in order to determine their relationships with both social and academic success. The initial step may consist of observations of many children in regular educational settings and then correlating the observation data with a primary external criterion, e.g., math achievement (Cobb, 1969, 1970, 1972). An alternative method for the initial investigation might be the manipulation of hypothesized relevant remediation variables in order to test their effectiveness within an experimental classroom setting (Walker, Fiegenbaum, & Hops, 1971).

The second and crucial step in the empirical model is to validate the correlational and/or experimental findings in the normal educational environment. Two important questions are asked at this juncture: 1)

In the real world setting, was there a significant change in the previously specified behaviors of children as a direct result of the remediation program? 2) Have the data demonstrated the existence of a causal relationship between the specified behaviors and the criterion variables?

The present paper illustrates the use of the empirical model to answer one of the questions arising out of our formulations: Is there a causal relationship between specific academic survival skills and reading achievement in the regular first-grade classroom? A review of the relevant research literature will be presented followed by an outline of the intervention procedures used in the study. Data, collected in the natural educational environment, will be examined to test the hypothesis.

Reading Achievement

Reading achievement in children has been studied in relation to a complex array of social, physiological, and psychological variables. These have included the socioeconomic status (SES) of the child's family, sex of the child, mental capacity (IQ) (Cobb, 1969; Gray, 1970), performance on a wide variety of perceptual-motor tasks (de Hirsch, Jansky, & Langford, 1966), early anoxia (Corah, Anthony, Painter, Stein, & Thurston, 1965), brain damage (Reed, Reitan, & Kløve, 1965), emotional disturbances (Gray, 1960; Balow, 1966), and personality factors (Cobb, 1969). The discovery of such relationships, where they exist, has been criticized as being irrelevant for use by the teacher in the regular classroom for increasing achievement (Bateman, 1966, 1967; Engelmann, 1967). The knowledge that etiological factors such as early anoxia or

brain damage are responsible for low achievement may be more important for purposes of prevention rather than remediation. Manipulating genetic, and physiological, variables is beyond the domain of the educator. The assumption that perceptual-motor deficiencies must be dealt with before reading achievement can be improved has also been criticized (Adelman & Feshbach, 1971) and based on equivocal findings (Halliwell & Sloan, 1972). Meikle and Kilpatrick (1971) found that reading achievement could be increased by direct instruction without concomitant gains in related perceptual-motor tasks.

While some form of emotional disturbance has been found in academic underachievers, Balow (1966) argues that it is difficult to determine the causal direction of this relationship. The treatment of emotional disorders has not been found to have affected school performance in children of grades three through six when compared with an untreated control group (Ashcraft, 1970). What is more, both groups fared significantly worse than the average expected gain per year over a five-year follow-up period. Cobb (1969) reviewed a number of studies in which personality variables had been manipulated in an attempt to increase academic achievement of elementary school students; none produced evidence of increases in achievement following personality changes.

Correlational Studies

More recently, there has been an increased emphasis on the investigation of the relationships between academic achievement and those behaviors which children emit in the classroom, which can be observed objectively, and which are potentially under the teacher's control. In a five-year predictive study, Meyers, Atwell, & Orpet (1968) demonstrated

significant relationships between behavioral ratings in kindergarten and scores on the subtests of the California Test of Achievement in the fifth grade. The behavioral rating on "Attention" was the most powerful predictor for three of the criterion subtests and the fourth and fifth best predictor for two others. The average correlation between all six of the subtests and the rating on "Attention" was 0.36. In another study by Lahaderne (1968), observers rated the attending behavior of sixth-grade children over a two-month period. The correlations with various standardized achievement tests ranged from 0.39 to 0.51.

In a major replication of the aforementioned correlational studies, Cobb (1970) demonstrated that greater relationships could be obtained if the behavioral categories were more precisely defined. Meyers et al. and Lahaderne used broad global ratings which may have included a number of irrelevant behaviors that masked the true relationship between specific response classes and achievement. Cobb's work was designed to ferret out only those specific behavioral classes which could be demonstrated to be predictive of achievement.

First-graders in three elementary schools were observed during reading and arithmetic periods. Children's rates on various behaviors were obtained and analyzed via a step-wise multiple regression procedure. The results demonstrated that higher correlations could be obtained using independent discrete behavioral categories than by using a composite score of total appropriate behaviors. Two behaviors, "Look around" (LO) and "Compliance" (CO) produced a correlation of 0.42 with arithmetic as opposed to 0.31 for total appropriate behavior. In reading achievement, the combined score was correlated at 0.42 whereas two

behaviors, "Attending" (AT) and "Volunteering" (VO), produced a correlation of 0.59.

The behaviors demonstrated to be powerful predictors of achievement were conceptualized as academic survival skills (Cobb, 1970, 1972) which were necessary, but not sufficient, for successful academic functioning. They were not academic behaviors per se, but, rather, the first components in a chain of correct academic responding. Staats (1968) has argued that "Formal education depends heavily on the prior establishment in the child of a repertoire of social discriminative stimuli that will control his attentional behaviors, and other motor behaviors as well (p. 509)." The work of Cobb has attempted to precisely define those child behaviors that must be under the teacher's control if her "teaching" is to be effective. Three precise behavioral categories were identified for each subject area. For reading they were AT, VO, and LO, a negatively related behavior; for mathematics they were AT, LO, and CO.

The implications of these findings are quite clear. All children, regardless of ability level, must first be taught the prerequisite skills that will enable them to take advantage of the educational opportunities being offered in the classroom. Each child must learn to look at the book before he can learn to read from it, whether it be a basal or phonics reader. Intervention procedures are, therefore, required which will aid teachers in teaching children the necessary survival skills before they teach the academic task itself.

Unfortunately, there is a paucity of data demonstrating the functional relationship between these behavior classes and academic achieve-

ment. In other words, will increases in children's rates of positively correlated behaviors directly result in increases in their scores on standardized achievement tests? The present study was designed to investigate the functional relationship between levels of survival skills and reading achievement.

Behavior Change

Little doubt remains that children's classroom behavior can be changed. The host of studies by behavioral researchers have amply demonstrated that behaviors presumed appropriate for the classroom setting can be accelerated and those behaviors considered inappropriate, and in competition with the former, decelerated. Encouraging results have been obtained with a number of different consequences in a variety of settings. These studies have been carried out in regular (Cobb, Ray, & Patterson, 1971) and special education (Hops, 1971) classrooms. Both social (Becker, Madsen, Arnold, & Thomas, 1967; Hall, Lund, & Jackson, 1968) and nonsocial or token reinforcers (Hewett, Taylor, & Artuso, 1969; Kuypers, Becker, & O'Leary, 1968; Walker, Mattson, & Buckley, 1971) have been used with group (McAllister, Stachowaik, Baer, & Condermon, 1969; Packard, 1970; Schmidt & Ulrich, 1968), and individual contingencies (Glavin, Quay, Annesley, & Werry, 1971; Patterson, Shaw, & Ebner, 1969). Successful interventions have been carried out by focusing directly on the behavior of the targeted children (Coleman, 1970; Schwarz & Hopkins, 1970) or by modifying teacher (Hall et al., 1968; Thomas, Becker, & Armstrong, 1968; Cossairt, Hall, & Hopkins, 1972) and/or peer behavior (Walker & Buckley, 1972).

Many of the reported studies have involved only the behavior of a

single student treated individually. The expense of focusing on individuals using extra personnel may not be justified. It has been suggested that a more practical and effective procedure would be to place the control of the entire classroom in the hands of the teacher by using group contingencies (Hall et al., 1968). Packard (1970) proceeded to develop a device which would allow the constant monitoring of all of the children in a class and yet be simple, economical, and reliable. Using a clock-light mechanism and group contingencies, teachers of four different classrooms from kindergarten through grade six were taught to use this device to increase the amount of classroom "Attention" successfully. Based on the aforementioned rationale and Packard's findings, the clock-light mechanism was utilized in the current study.

While the ease with which changes in children's classroom behavior can be achieved has been demonstrated, there has been little attention paid to solving the problem of maintenance. Patterson, Cobb, & Ray (1972) have argued that reprogramming the total social environment may result in continued social reinforcement of appropriate responses by the social agents even after the experimenters have departed and tangible reinforcement is no longer used. Tangible or nonsocial reinforcement can be used during the intervention procedure proper to make the social praise and attention of the social agents more powerful reinforcers as was demonstrated by Walker, Fiegenbaum, & Hops (1972). Involving both teachers and peers, Patterson et al. (1972) obtained effective maintenance of appropriate behavior in their targeted children for periods ranging from six months to two years. Walker and Buckley (1972) found a maintenance procedure which included the peers was more successful

than a limited teacher training procedure. However, Cossairt et al. (1972) found that instruction and feedback without social praise was unsuccessful in modifying teacher behavior. The current study, therefore, implemented a teacher training program using experimenter instruction, cueing, modeling, feedback, and praise. The teacher then trained the students using similar techniques backed up by group reinforcement contingencies.

Behavior and Achievement

Lipe and Jung (1971) have suggested that simply focusing on increasing appropriate behavior in the classroom is insufficient. They state, "there is a need for a clear and empirically demonstrated rationale relating such behaviors to measured achievement" (p. 274). Unfortunately, there has been almost no attempt to partial out the direct effects of increases in attention, time on task, or survival skill behaviors on academic achievement. In most studies presenting data on achievement changes, the treatment variables have been so confounded as to make the relationships between behavioral and academic improvement nonspecifiable. In two major studies utilizing token economies (Hewett et al., 1969; Walker, Mattson, & Buckley, 1971), the use of innovative curriculums plus contingent social and nonsocial reinforcement has made it impossible to determine the independent effects of behavioral changes. In fact, the Hewett et al. (1969) study produced only minor increases in reading achievement with no significant differences between the controls and the experimentals. The present study was an attempt to demonstrate that not only does a relationship exist between survival skill behaviors and achievement, but, more specifically, that increases in the former

will directly result in concomitant increases in scores on standardized reading achievement tests. The main hypothesis, therefore, states that students who receive training in survival skills would make significantly greater gains in reading achievement than the control students.

Method

Subjects

The subjects were all of the children in three regular first-grade classrooms in a school district of approximately 21,000 students. By random selection, one classroom was designated as control (N = 20) and the other two as experimental (N = 42).

Achievement Tests

As part of an overall reading battery, the Gates-MacGinitie Reading Readiness and Primary A were administered prior to and approximately four to six weeks after the intervention program. The mean of each child's standard scores on the Readiness test, and the two subtests of the Primary A, Vocabulary and Comprehension, was computed for each administration.

Observations

During each week in which achievement testing occurred, observations were made of classroom behavior during reading periods for five consecutive days. An interactive coding system developed by Cobb & Hops (1971) was used to record the behavior of all of the children in a pre-arranged fashion. Each student was observed for two continuous eight-second intervals before the observer went on to the next child on the list. After the entire group had been sampled, the observer returned to the first child and began the sequence again. In this way, the behavior of each

student was sampled several times during each observation session.

Four full-time and six part-time observers were used in the study. Each new observer was trained until an 85% or greater agreement was reached on three occasions with an experienced observer. Observer reliability was calculated by dividing the total number of agreements by the total number of agreements and disagreements. Reliability data was collected systematically between various pairs of observers throughout the study. Based upon 19 paired observations, the range of reliabilities was 85% to 99% with a mean of 94%.

Cobb (1970) reported correlations between first-grade reading achievement and three survival skills "Attending" (AT), "Volunteering" (VO), and "Look around" (LO) of .45, .59, and -.41, respectively. For the present study, AT was divided into two new independent behavior categories, "Attending" (AT) and "Work" (WK). To compute the level of survival skills for each period of observation, the frequency of LO was subtracted from the summed frequencies of AT, VO, and WK for each student. This figure was divided by the total frequency of all behaviors which represented the proportion of time a child engaged in survival skill activities.

Intervention

The details of the intervention program are presented in another paper (Cobb & Hops, 1972) and will be briefly outlined here. All of the procedures took place in the regular classroom with the experimenters acting as consultants to the teachers. The model was based on the work of Packard (1970), Patterson et al. (1972), and Walker, Mattson, & Buckley (1971). Packard developed a clock-light mechanism which allowed the teacher to observe the behavior of the entire class and record the

total amount of time the entire group was engaged in "Attending" behavior. Walker et al. demonstrated that a token economy program could be effectively utilized to increase the amount of appropriate behavior in acting-out children, and Patterson et al. found consistent long-term gains after social agents had been involved in the overall program.

The teachers were taught to monitor the entire group individually and to use a new set of social behaviors including the increased use of praise for survival skill behavior. To train the teachers, the experimenters frequently praised them for correct responding and, in addition, used modeling, cueing, and daily feedback during the initial stages. All of these actions were faded out as the proportion of time the children engaged in appropriate behavior increased. Readings which coincided with various aspects of the training program were assigned from two programmed textbooks, Living with Children (Patterson & Gullion, 1968) and Modifying Classroom Behavior (Buckley & Walker, 1970).

Components of the child-training program which were taught to and utilized by the teachers included: 1) the pairing of social and nonsocial reinforcement when used alone (Walker, Fiegenbaum, & Hops, 1971), 2) vicarious reinforcement, which acts to increase the rate of appropriate behavior in nontask-oriented children and provides more frequent opportunities for the teacher to dispense praise to all children contingently. Rather than disapprove the inappropriate behavior of low functioning students, the teacher publicly praises other children's appropriate behavior, a situation which tends to elicit appropriate behavior in the low rate students who, then, can be contingently praised as well; 3) shaping procedures so that the criterion for reinforcement is adjusted upwardly as

the group demonstrates increased performance levels, and 4) the fading of nonsocial reinforcers as the children progressed. The total period of intervention was 20 school days, and the total consultant time required in each classroom was approximately 12 hours.

Results

To demonstrate the existence of a causal relationship between survival skills and academic achievement, it was necessary to show a concomitant change in both variables such that the group making the greatest gains in achievement would also make the greatest survival skill increases.

Table 1 shows the mean baseline and post-intervention levels of survival skills and achievement for the experimental and control students. The mean proportion of the experimental groups' survival skills at the outset was .57 which increased to .69 following intervention, a gain of .12; in contrast, the controls began at .63 and gained only .03. The experimental group, having begun at a lower level than the controls, surpassed them on the post-intervention measure. A two-way analysis of variance with repeated measures on one factor (Winer, 1962, p. 302) indicated a significant treatment ($F = 37.75$, $df = 1/60$, $p < .0005$) and interaction ($F = 8.80$, $df = 1/60$, $p < .005$) effect providing statistical evidence that the experimental group gained more in survival skills than the control.

Similar findings were obtained from the analysis of the achievement data which produced significant treatment ($F = 287.93$, $df = 1/60$, $p < .0005$) and interaction ($F = 10.65$, $df = 1/60$, $p < .005$) effects. The experimental children had lower baseline (48.4 versus 52.5) and higher post-intervention (60.3 versus 60.0) scores, gaining significantly more

TABLE 1

Mean Proportion of Survival Skills and Mean Standard Scores for Reading Achievement for Experimental and Control Groups at Baseline and Post-Intervention

Group	Survival Skills				Reading Achievement			
	Baseline		Post-Intervention		Baseline		Post-Intervention	
	M	SD	M	SD	M	SD	M	SD
Experimental (N = 42)	.57	.11	.69	.12	48.4	6.9	60.3	6.6
Control (N = 20)	.63	.09	.66	.12	52.5	7.5	60.0	8.3

standard score points in reading achievement (11.9 versus 7.5) than the controls.

The data was consistent with the main hypothesis that an increase in survival skills would lead to a similar increase in academic achievement. However, the repeated measures analysis of variance has been criticized for use with groups differing on initial status (Werts & Linn, 1971). To obviate the possible confounding of baseline levels and treatment effects, a post hoc analysis using a matching technique was employed (Cobb & Hops, 1972). All experimental subjects within ± 1.33 standard score units on baseline achievement and ± .05 proportion on baseline survival skills of any control subjects were selected for further analysis. The matching criterion was met by 12 controls and 16 experimental subjects.

The results were consistent with the findings for the larger group. With more evenly matched mean survival skill scores and standard deviations, as shown in Table 2, the experimental group gained .18, more than three times the .05 increase of the control group. Again, both treatment ($F = 48.71$, $df = 1/26$, $p < .0005$) and interaction ($F = 11.38$, $df = 1/26$, $p < .005$) effects were obtained.

The achievement gains were highly similar. The treatment ($F = 142.62$, $df = 1/26$, $p < .0005$) and interaction ($F = 11.32$, $df = 1/26$, $p < .005$) effects were both significant. The data in Table 2 shows that the experimental group gained almost twice as much academically (11.8 versus 6.4) as the control group. The post hoc analysis indicated that the differential gains obtained in the analysis of the entire groups were not simply a function of initial status.

TABLE 2

Mean Proportion of Survival Skills and Mean Standard Scores of Reading Achievement for Matched Experimental and Control Groups at Baseline and Post-Intervention

Group	Survival Skills				Reading Achievement			
	Baseline		Post-Intervention		Baseline		Post-Intervention	
	M	SD	M	SD	M	SD	M	SD
Experimental (N = 16)	.59	.06	.77	.08	50.1	7.1	61.9	6.4
Control (N = 12)	.63	.06	.68	.09	51.7	6.9	58.1	8.4

Discussion

The empirical model developed in the Center for the investigation of key variables to successful social and academic functioning is considered germane to the realization of our goals. The research process, as practiced in the Center, for the most part, follows a progressive series of orderly logical steps. At each step in the process, hypotheses are critically tested with hard data.

The critical test of the validity of the research process always occurs in the natural environment. Sidman (1960) argues that the generality of data is one of the three most important questions in the evaluation of experimental findings. In the real world, correlated variables can be tested functionally for the causal direction of the relationship. In addition, variables shown to be effective under controlled conditions can be tested for their efficacy under natural conditions. The results answer a number of theoretical questions, generate new hypotheses in a progressive feedback process, and, most important, provide essential data for the evaluation and development of remedial procedures.

The practical implications of the illustrative study's results are quite clear: first grade teachers can be trained to increase students' survival skill levels so that reading achievement can be beneficially effected. The set of intervention procedures may be a relatively useful model for the variety of professionals who act as consultants to teachers. In the study, the consultant's time in the classroom averaged slightly more than one-half hour per child. Combined with the minimal effort required of the teacher, it would appear that such procedures can be easily introduced into the educational environment with effective results.

A number of related research questions are still to be answered. For example, it may be argued that increases in achievement may be obtained through curriculum intervention without concomitant increases in survival skills. It is highly probable, however, that a minimum level of survival skills may be required before any curriculum intervention program would be effective. If children do not attend to the teacher or follow instructions, it is unlikely that even the best designed curriculum would have significant effects. Further analyses of two years of extensive data collection will be conducted in attempts to answer these and other important questions.

The present paper was an attempt to illustrate the approach used by CORBEH in solving educational problems; perhaps the content of the findings has also made a small but significant contribution to our understanding of the relationship between survival skills and achievement.

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